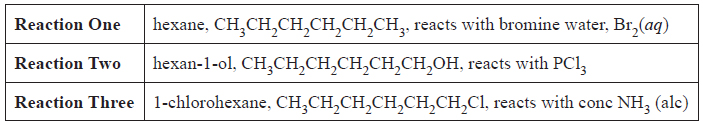
**Types of Reactions**

**1)** The reactions shown below are all classified as being the same type of reaction.



Compare and contrast these reactions.

In your answer you should:

• state whether any conditions are required

• describe the type of reaction occurring and explain why all three reactions are classified as this type of

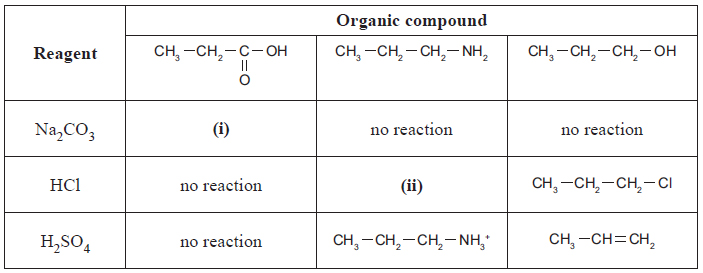
reaction

• explain why two layers form in **Reaction One**.

**2)** Sodium carbonate, hydrochloric acid, and sulfuric acid are each added to separate samples of three

organic compounds.

The structures of the compounds and the products of any reactions are given in the table below.



Compare and contrast the reactions that **do** occur between these organic compounds, and the reagents in the

table above.

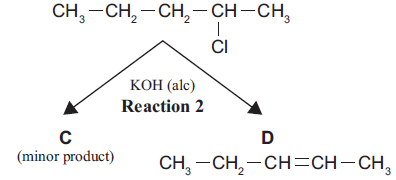
In your answer you should:

• give the structure of the organic products **(i)** and **(ii)**

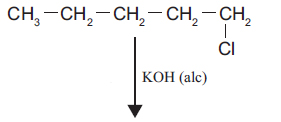
• describe the different types of reactions occurring, and give reasons why they are classified as that type

• identify any specific conditions that are required for the reactions to occur.

**3) i)** Explain why the reaction shown below, is classified as an elimination reaction.



**ii)** The reaction belowis also an elimination reaction. Draw the structural formula of the product formed



#### 4) Butan-1-ol can react separately with each of PCl5, Cr2O72–/ H+, and concentrated H2SO4. For each reaction, your answer should include: the type of reaction occurring and the reason why it is classified as that type

**5)** Chloroethane, CH3CH2Cl, reacts with aqueous KOH, alcoholic KOH, and with NH3. Compare and

contrast the reactions of chloroethane with the three reagents. In your answer you should include:

• the type of reaction occurring and the reason why it is classified as that type

• the type of functional group formed

• equations showing structural formulae for reactions occurring.

**6 i)** The types of reactions below can be described as addition, elimination, or substitution reactions.

Allocate these reaction types to each of the four reactions

|  |  |  |
| --- | --- | --- |
| 1) | CH3–CH2–CH2–OH 🡪 C3H7Cl | Reaction type: |
| 2) | C3H7Cl 🡪 CH3–CH2–CH2–NH2 | Reaction type: |
| 3) | CH3–CH2–CH2–OH 🡪 C3H6 | Reaction type: |
| 4) | C3H6 🡪 C3H7Cl | Reaction type: |

**ii)** Compare and contrast the similarities and differences between addition, elimination, and substitution reactions. You should use the examples of the reactions above in your answer

**7)** For the following reaction:

• Write the structural formula of the organic product formed.

• State the type of reaction occurring. Choose from the word list: elimination or addition or oxidation

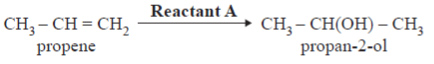
or substitution or hydrolysis or halogenation or acid-base



**8)** For each of the THREE following reactions:

• Write the name or structural formula of the reactant used.

• State the type of reaction occurring. Choose from acid-base or addition or elimination or hydrolysis or substitution

i) 

ii) 2.jpg

iii) 3.jpg

**9)** Hydrocarbons can undergo addition and substitution reactions.

Compare and contrast addition and substitution reactions. Use the reactions of ethane, CH3–CH3, and

ethene, CH2=CH2, with chlorine as your examples in your answer.

Your answer must also include:

• a description of each type of reaction

• conditions for addition and substitution reactions

• equations showing the structural formulae of the organic reactant(s) and product(s).

**10)** i) Write the **IUPAC name** or the **structural formula** of the product formed.

ii) State the type of reaction occurring. Choose from the following words: acid-base or addition or elimination or hydrolysis or oxidation or polymerisation or substitution

a) Ethanol is heated with a catalyst (either concentrated sulfuric acid or aluminium oxide).

b) Propanoic acid is reacted with sodium hydroxide solution.

c) Propene is reacted with hydrogen in the presence of a nickel catalyst at 150°C.

**11)** **Compare and contrast** the reactions of ethene and ethanol with acidified potassium permanganate.

For each reaction you must include:

• observations

• equations showing the structural formulae of the organic reactant and product

• type of reaction occurring.

12) Some reactions involving organic compounds can be classified as addition or elimination.

Use the examples (a) and (b) given below to clearly explain the type of reaction involved:

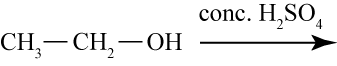
(i) complete the equation to show the main organic product formed

(ii) use the example to explain why it is classified as that type of reaction.

a) When HCl reacts with but–1–ene an addition reaction occurs.

Q3, Comp (a)(i), 90309

b) When ethanol is heated with concentrated sulphuric acid an elimination reaction occurs.



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